

# A Revision of the *Phragmipedium schlimii* Complex (Orchidaceae: Cyripedioideae)<sup>a</sup>

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**Keywords/Mots-clés :** Neotropics/Néotropiques, *Phragmipedium schlimii*, *P. andreettae*, *P. anguloi*, *P. fischeri*, *P. schlimii* forma *manzurii*, Plant taxonomy/Taxinomie végétale.

## Abstract

*Phragmipedium schlimii* Linden ex Reichenbach f. and the related species *P. andreettae* Cribb & Pupulín, *P. anguloi* Braem, Tesón & Manzur, *P. fischeri* Mohr & Braem and *P. manzurii* Higgins & Viveros are reviewed. *Phragmipedium manzurii* is found to differ from *P. schlimii* only by its flower colour and is therefore reduced to a form of the latter. All species and the known and validly described variants of *P. schlimii* are discussed, described and documented by illustrations. A key to the species of the *Phragmipedium schlimii* Complex is given.

## Résumé

**Révision du complexe « *Phragmipedium schlimii* » (Orchidaceae : Cyripedioideae)** – *Phragmipedium schlimii* Linden ex Reichenbach f. et les espèces alliées *P. andreettae* Cribb & Pupulín, *P. anguloi* Braem, Tesón & Manzur, *P. fischeri* Mohr & Braem et *P. manzurii* Higgins & Viveros sont révisées. *Phragmipedium manzurii* ne diffère de *P. schlimii* que par la couleur de sa fleur : il est par conséquent réduit à une forme de ce dernier. Toutes les espèces ainsi que les variantes connues et valablement décrites de *P. schlimii* sont discutées décrites et illustrées. Une clé pour l'identification des membres du complexe est proposée.

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## Introduction

The *Phragmipedium schlimii* Complex is part of *Phragmipedium* subgenus *Micropetalum* (Braem, 2011), a subgenus well characterised by plants with small flowers in which the petals are shorter than 3 cm. It comprises five taxa that have been described at the species level:

*Phragmipedium schlimii* (Linden ex Reichenbach f.) Rolfe (1896),

*Phragmipedium fischeri* Braem & Mohr (1996),

*Phragmipedium andreettae* Cribb & Pupulín (2006),

*Phragmipedium manzurii* Higgins & Viveros (2008),

*Phragmipedium anguloi* Braem, Tesón & Manzur (2014).

*Phragmipedium schlimii* was discovered by Louis-Joseph Schlim (1819-1863), the half-brother of the famous Belgian explorer and horticulturist Jean Jules Linden, in 1852, on the eastern cordillera of New Granada (now Colombia), near Ocaña, at an elevation of about 1,200 m (ca. 4,000 ft.) above sea-level. The first living plants, however, did not reach the Linden establishment in Brussels (Belgium) until they had been rediscovered by Wagener, another collector for Linden, two years later. The species was described by Reichenbach (1854) as *Selenipedium schlimii*. As Reichenbach indicated that he based his publication on notes from Linden, it is best to credit the taxon to both authors.

Linden, in his famous *Pescatorea*, wrote (translated from the French original by the senior author):

“One will recall *Selenipedium caudatum* ... Although this noble orchid is still without any rival within the genus in respect to its gigantic dimensions and the bizarre form of its flowers, *Selenipedium schlimii*, though much more modest in its proportions, must not fear any comparison in regard to the delicacy of its form and colours ...”

*Phragmipedium schlimii* may have been well-represented in the famous collections until the beginning of the last century, but it never seemed to have been abundant in cultivation. Over the last 50 to 70 years it has become a rarity in European as well as in North American greenhouses, mainly due to faulty cultural methods. That may be one of the reasons why this delightful plant has often been misinterpreted, and some famous (or perhaps ‘infamous’) plants such as *Phragmipedium schlimii* [*sic*] ‘Birchwood’ and *Phragmipedium schlimii* [*sic*] ‘Wilcox’, both highly and repeatedly awarded, are simply hybrids. The origin of this misinterpretation is found in an article about *Phragmipedium schlimii*, published by the late Jack Fowlie

(1970). Jack and his party had actually visited the same area where Schlim discovered *P. schlimii* in 1852, and his article is of great interest in respect to the natural habitat of the species. Unfortunately, it was illustrated with the picture of a plant generally referred to as *P. schlimii* 'Wilcox'. This plant is nothing but a garden hybrid and identical with the plant generally referred to as *P. Cardinale*, a secondary hybrid of questionable parentage. It is difficult to understand Fowlie's error. He obviously was at one of the habitats, presumably in July of 1968 or 1969, as can be deduced from the detailed account in his article:

"The lady'slipper, *P. schlimii*, required little time to uncover and was found in our first afternoon of exploring. Ralph Spencer had gone up a small side creek and not a hundred yards from the road discovered it growing under such typical circumstances that they are well worth relating. [...]

Once the eyes became accustomed to the habitat great old clumps of lady'sslippers began to appear. The finest specimens grew in two kinds of situations. The first was in clumps of leaf mold and detritus, attached to abrupt angles on the sides of slopes with their roots affixed to the previously described net-like root mats of the surrounding trees and shrubs. [...] The second and perhaps most successful situation was in a rocky crevasse where the roots of the plant had worked their way into a moist fissure with such force they could hardly be removed intact. [...] Numerous plants were found wedged into the horizontal or vertical cracks where upwelling moisture from the seepages above found an outlet along the fissures or coursed along them downhill at an angle. The only soil of consequence in these fissures had a high Kaolin content, and the roots themselves were frequently buried in that material, kept moist – rainy season or dry, hot or cold – by the continual spring seepage. This colony was on a northward facing slope, receiving no sunlight but instead bright light reflected off the facing rocks of the other side of the barranca. [...]"

Fowlie relates finding "several other colonies of *Phragmipedium schlimii*" but never gives even the slightest hint of having seen a plant in flower.

The picture Fowlie used for his 1970 article was again printed, albeit inverted, to illustrate the reprint of an article by John E. Lager (1978) in *The Orchid Digest* (Fig. 1). The text of the article was first published in the *American Orchid Society (AOS) Bulletin* for 1932 (Lager, 1932). Obviously, the illustrations for the reprint in *Orchid Digest* were chosen by Jack Fowlie, who was the editor, and the legends to the illustrations may be assumed to have been written by him.

*“Phragmipedium sp. nov.* This new species of *Phragmipedium* is 6 cm in diameter and came originally from the southern portion of Colombia where the cordilleras join. In recent years it has been confused with *Phragmipedium schlimii* (Rchb. f.) Rolfe, primarily because of its colour. However, comparing the staminodes of the two plants and tips of the petals, there are obvious distinct and important differences. Dr. Kennedy believes it is *Phragmipedium stenophyllum* [sic] Hort. ex Day.”



**Fig. 1: *Phragmipedium “schlimii”*** **Fig. 2: *Phragmipedium schlimii***  
*sensu* Fowlie (1970) from Lager (1978)

But for the Lager article reprint, Fowlie also chose another illustration (Fig. 2), this time of a real *Phragmipedium schlimii*, which he placed on the same page as the picture of the *P. Cardinale* (using Fowlie’s size indication, it could be calculated that the flower depicted was 2.48 cm high by 3.36 cm across). Fowlie’s legend for this second illustration reads:

*“Phragmipedium schlimii* (Linden ex Reichenbach.fil.) Rolfe.  $\times 2\frac{1}{2}$ . The original plants of this lady’slipper species were collected by Franz [sic] Joseph Schlim in the 1840’s in the Eastern Cordillera of Colombia near Ocaña. The plants from that region have a deeply red-flushed labellum.”

Thus, by 1978, Fowlie did know the real *Phragmipedium schlimii*. However, albeit an excellent medical doctor, Fowlie had no training in botany and had somewhat aberrant opinions about taxonomy and evolution. Obviously, the natural variety of a species could not and cannot include such difference in flower morphology as shown by the two illustrations on page 232 of the Lager article.

Obviously, Jack Fowlie had not checked the pertinent literature: Linden *et al.* (1855), Reichenbach (1858), Bateman (1866), Van Houtte (1870) and André (1874), etc., of which some, admittedly, is in French or German. Had he done so, he might have realised that the true *P. schlimii* is invariably small-flowered, with reflexed petals and a yellow staminode (Fig. 3).



**Fig. 3:** *Phragmipedium schlimii*  
from Linden *et al.* (1855)

*Phragmipedium* Cardinale was registered by Veitch & Sons in 1882 as being *P. Sedenii* × *P. schlimii*, and *P. Sedenii* was registered by that same firm in 1873 as being *P. longifolium* × *P. schlimii*. We know, however, that Veitch & Sons made an error (or simply lied to protect their assets) when indicating the parentage of their famous hybrid, as the cross of *P. longifolium* with *P. schlimii* does not yield plants that correspond to the Veitchian *P. Sedenii*. The true identity of the latter hybrid thus remains a mystery, and so does the correct identity of all further generations of hybrids that were obtained with *P. Sedenii* and/or its progeny.

*Phragmipedium schlimii* ‘Birchwood’ and *P. schlimii* ‘Wilcox’ have been known to be hybrids for more than 40 years, and in March of 1975, Fort Caroline Orchids, in an advertisement in the *AOS Bulletin* warned that many clones of *P. schlimii* in commerce (some of which had been awarded) were nothing but hybrids “masquerading” as *P. schlimii*. But even today some commercial growers insist on marketing these hybrids as “specially nice and large-flowered forms of *P. schlimii*”, a practice that may find at least some of its roots in the fact that for decades the American Orchid Society (and others) have refused to correct the errors.

The results of this malpractice are well known. In the first 64 years, only 2 correct illustrations of *Phragmipedium schlimii* were to be found in the *American Orchid Society Bulletin* (later *Orchids*). After our article in *Orchids* for February 1996 (Braem, 1996), the discussion was brought up again, but there was no correction of the awards. It was quite disturbing that with the publication of that article, the editor of *Orchids* rejected a photograph of the true *Phragmipedium schlimii* in favour of the illustration of the article with hybrids!

A further confusion appeared with the registration of *Phragmipedium* Hanne Popow. It was registered in 1991 as *P. besseae* × *P. schlimii*. From the flowering plants that we have seen, it is evident that at least some of the “Hanne Popows” must have been made with either *P. schlimii* ‘Wilcox’ or *P. schlimii* ‘Birchwood’. In at least one case, this hybrid has been awarded as *P. schlimii*.

In view of the above, the identity of ALL hybrids of *P. schlimii* should be questioned as to their proper identity.

Additional confusion arises (and will arise) from the description of *Phragmipedium andreetae*, *P. anguloi*, *P. fischeri* and *P. manzurii*. All four of these taxa are very close to *P. schlimii*, and we are convinced that some

plants of these taxa have been and are in cultivation labelled as *P. schlimii*, and may have been awarded as such. The fact that we recently discovered, in our own collection, two pictures showing a flower, very obviously answering to the concept of *Phragmipedium andreettae*, photographed by Rudolf Jenny in the years 1986 and 1988 respectively, at European orchid shows, supports that assumption.

## Results

After studying this group of orchids intensely over several years, we have come to the conclusion that four of the five described species should be retained, and that these four taxa can be fairly easy differentiated.

### Key to the species belonging to the *Phragmipedium schlimii* complex.

(See Fig. 4 & 5)

- 1 pouch spherical, not laterally compressed ..... 2
- 1a pouch elongate, laterally compressed ..... 3
- 2 pouch without fenestrations, staminode strongly polygonal and invariable in shape ..... *P. fischeri*
- 2a pouch with fenestrations, staminode ovate-panduate to triangular-rhomboid, not strongly polygonal, quite variable in shape ..... *P. schlimii*
- 3 pouch without fenestrations, petals distinctly twisted ..... *P. andreettae*
- 3a pouch with fenestrations, petals not twisted ..... *P. anguloi*

### *Phragmipedium schlimii* (Linden ex Reichenbach f.) Rolfe

*The Orchid Review*, 4: 327-334 (1896)

Basionym

*Selenipedium schlimii* Linden ex Reichenbach f.

*Bonplandia*, 2: 277-278 (1854)

Homotypic synonyms

*Cypripedium schlimii* (Linden ex Reichenbach f.) Bateman

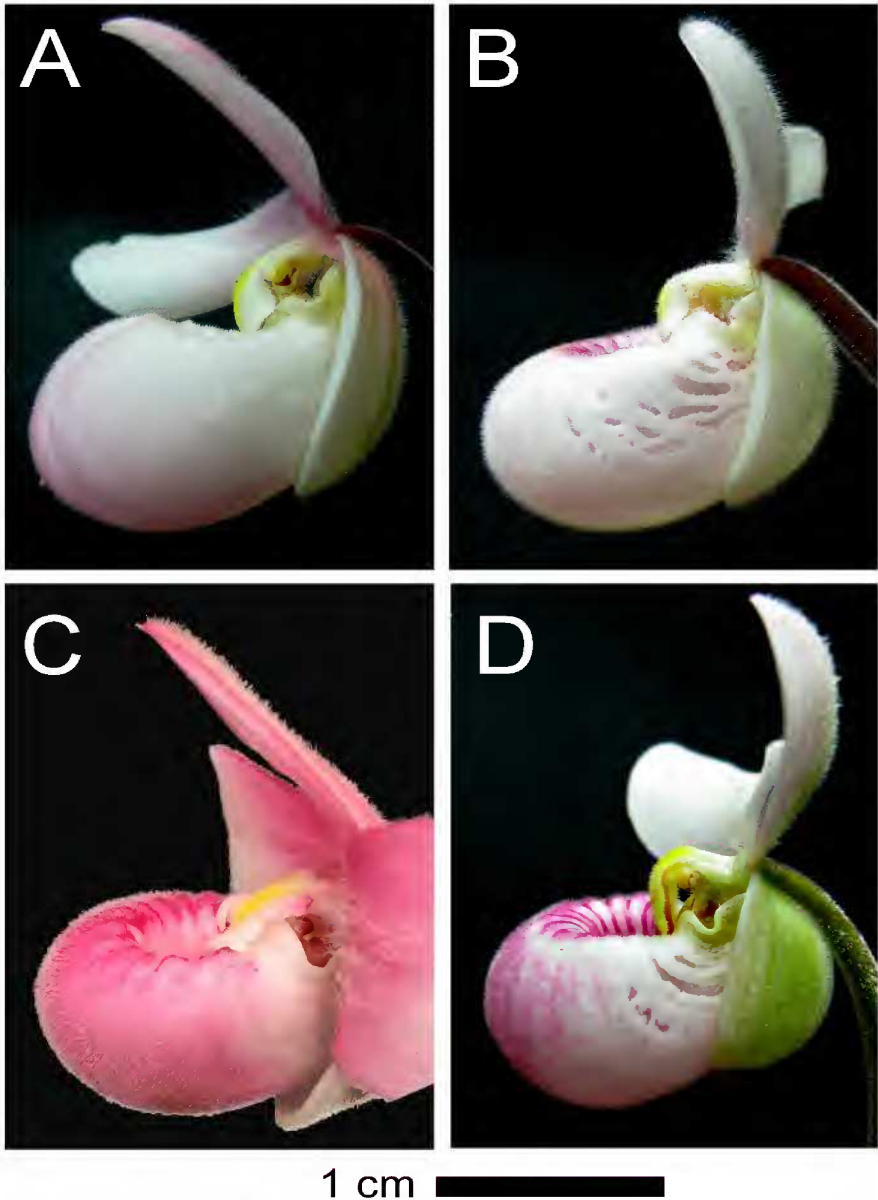
*Curtis's Botanical Magazine*, 3rd series, 22 [92]: t. 5614 (1866)

*Paphiopedilum schlimii* (Linden ex Reichenbach f.) Stein

in *Stein's Orchideenbuch*: 483 (1892)

*Phragmopedilum schlimii* (Linden ex Reichenbach f.) Pfitzer

in A.Engler, *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie*, 25: 517-528 [527] (1898)



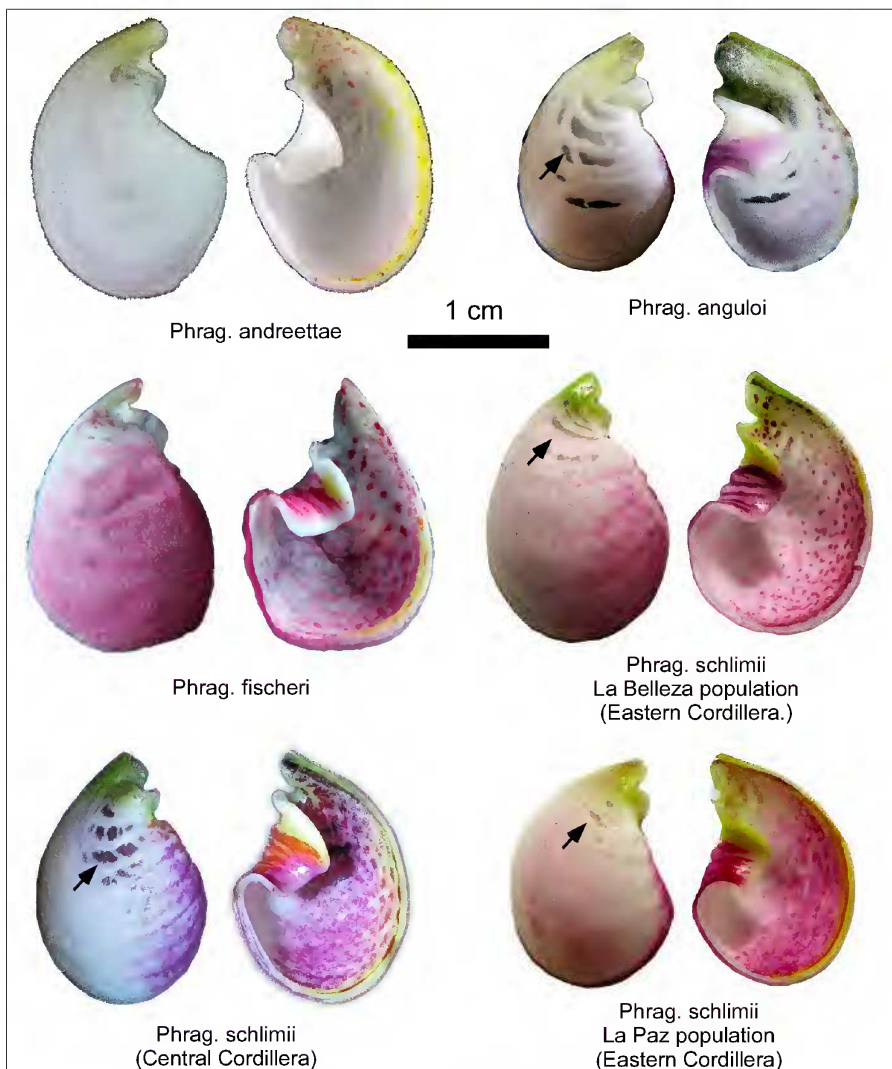
**Fig. 4: A comparison: (from left to right)**

top: *Phragmipedium andreettae*, *P. anguloi*, and bottom: *P. fischeri*, *P. schlimii*.

Pictures A, B & D and Plate by Eliseo Tesón.

Picture C courtesy of Orchids Limited (Jerry Fischer)





**Fig. 5: A comparison of the pouches within the *Phragmipedium schlimii* complex**

Black arrow indicating fenestrations

*P. fischeri* by Tobias Nink, all other pictures and Plate by Eliseo Tesón.

Type: Colombia. Ocaña, 1200 m, Schlim 407 (W !)

Etymology: named *schlimii* for Louis Joseph Schlim (1819-1863).

Description: *Phragmipedium schlimii* is an herbaceous plant generally growing in pockets of leafy debris. The rhizomes are to 3 cm long by 1 cm thick. The roots are usually striate, up to 4 mm in diameter. The leaves are elliptic to lanceolate-elliptic, up to thirty cm long and up to 4 cm wide, rather leathery, glabrous, pale to medium green, often with a purple base. The margins are revolute, the apex minutely trifid. The inflorescence is up to 30 cm long, sparsely velutinous, purple, carrying 1 to 10 flowers, sometimes branched, especially in the Eastern Cordillera populations. [The plate from the *Pescatorea* shows the plant with a branched inflorescence.] The floral bracts are ovate-triangular, navicular, 2 to 4 cm long by 1.4 to 2 cm wide. The bracts are always shorter than the ovary, glabrous, distinctly keeled, fused for about 6 mm from the base on the marginal side. The flowers are whitish-pink to magenta. The outer surfaces are strongly pilose-velutinous; the inner surfaces are glabrous to sparsely pubescent. The margins are glabrous or finely ciliate. The dorsal sepal is ovate-elliptic, 1.5 to 2 cm long by 1 to 1.2 cm wide, pink or white with pink infusions, acute, outer surface pilose, margins ciliate, apex acute. The synsepal is elliptic, 1.3 to 2 cm long by about 1 cm wide. It is smaller than the labellum, pink to white infused with pink, margins ciliate, apex acute to minutely bifid. The petals are obovate to rhomboid, 1.5 to 2.4 cm long by 1 to 1.4 cm wide, white with pink infusions. The petals stand at a 90° angle to the labellum, and their apex is obtuse. The petals become strongly reflexed within days after the flowers open. Their inner surface is sparsely puberulent; at the base there are white, with villous-arachnoid hairs. The pouch is rounded to slightly pointed, 1.6 to 2.5 cm long by up to 1.4 cm wide, pink to magenta. There is thin interveinar tissue forming “windows” on the sides of the labellum (these areas are generally referred to as fenestrations and most probably play an important role in the pollination process. The insect, once trapped in the pouch and searching frantically for a way out of this involuntary dark domicile, mistakes these windows for exits and is thus guided toward the back of the pouch and the tube that leads past the stigmatic surface and the pollinia into freedom). The labellar aperture is round to oval, the rim generally dark pink or magenta and minutely pubescent, slightly scalloped. The staminode is ovate-pandurate, 6 to 10 mm long by 5 to 9 mm wide, bright yellow with 1 to 2 reddish-purple spots apically, puberulous, lateral and basal margins often white, finely ciliate, the apex acute to shallowly bi-lobed. The column is only

about 3 mm long, whitish-pink, pilose. The ovary, including the pedicel, is 5 to 9 cm long, dark purple, hirsute. The capsule is dark brown, hirsute. The chromosome count has been reported as being  $2n = 30$  (Karasawa, 1980; Wimber, 1983; Atwood, 1984). The plants flower all year round.

Fig. 6 & 7.



**Fig. 6:** *Phragmipedium schlimii* (Linden ex Reichenbach f.) Rolfe

Photograph courtesy of Orchids Limited (Jerry L. Fischer)

Natural Habitat and Distribution: *Phragmipedium schlimii* is found on wet slopes and in rocky crevices in the rain forests of Colombia (many of the plants grow on nearly vertical cliff surfaces where there is plenty of runoff water. Therefore, they require extreme care and very good drainage when cultivated in pots). The habitats are generally located between 1,200 and

2,000 meters (about 4,000 to 6,600 ft.) above sea level. The relative humidity in these areas is 70 to 80% throughout the year. In some habitats, *P. schlimii* is found in the same area as plants answering to the concept of *P. andreettae*.



**Fig. 7: *Phragmipedium schlimii* (Linden ex Reichenbach f.) Rolfe**  
from Bateman (1866)

The roots of the plants penetrate the humus-filled cracks and crevices very deeply and are, therefore, difficult to dislodge. *Phragmipedium schlimii* occurs on the eastern as well as on the western slopes of both Andean Cordilleras.

Werner Hopp (in Schlechter, 1924: 11) reports a habitat along a road close to Macoa, at 1,500 metres (ca. 4,900 ft.), where he observed that “millions” of *Phragmipedium schlimii* and *Houlletia clarae* covered the rock faces.

***Phragmipedium schlimii* forma *manzurii* (Higgins & Viveros) Braem & Tesón, comb. et stat. nov.**

Basionym: *Phragmipedium manzurii* Higgins & Viveros

*Lankesteriana*, 8(3): 89-92 (2008)

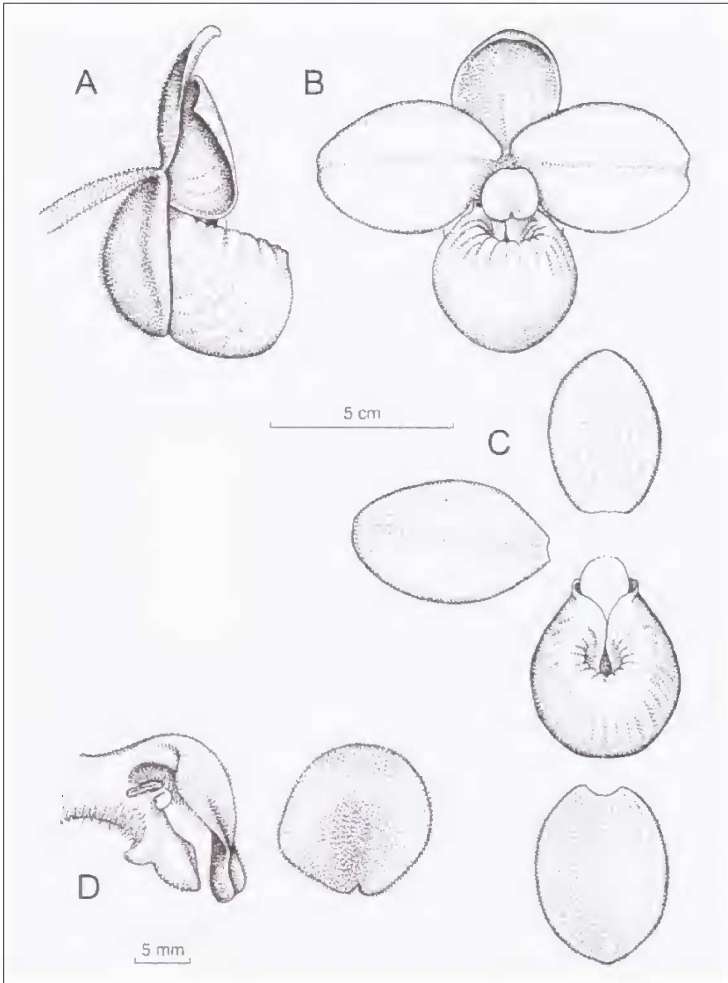
Type: Colombia: Santander: ex hort. D. A. Manzur, June 2008 (FAUC)

The taxon is based on a plant found near Santander, Colombia, and cultivated by Prof. David Manzur, whose name it bears. Originally known as “the *schlimii* from the Eastern Cordilleras,” it was described as an autonomous species but differs from *P. schlimii* only by the coloration of the flowers; we cannot recognise any characteristics that do not fit within the natural variability of that species. Fig. 8, 9 & 10.



**Fig. 8: *Phragmipedium schlimii* fma. *manzurii* (Higgins & Viveros) Braem & Tesón**

Photograph by Eliseo Tesón



**Fig. 9: *Phragmipedium schlimii* fma. *manzurii* (Higgins & Viveros) Braem & Tesón**

A- Flower side view. B- Flower frontal view. C- Flower dissection. D- Column with staminode side view, and staminode frontal view – from Higgins & Viveros (2008)

The plant described by Higgins & Viveros (and deposited as type) has proven to be a pseudo-albinesque form and unfortunately has been given the name “*albiflorum*” in the horticulture scene and the internet. Beside the fact that the flower is by no means white as insinuated by the designation *albiflorum*, this designation will cause confusion, since there is a *P. schlimii*

fma. *albiflorum*, the colour of which is very different (see Fig. 11 & 12). As *P. schlimii* is extremely variable in respect to flower colour, it does not surprise that plants of forma *manzurii* show a similar variability. In fact, there are not two populations that show exactly the same colour pattern.



**Fig. 10:** *Phragmipedium schlimii* fma. *manzurii* (“*albiflorum*” clone)

Photograph by Eliseo Tesón.

***Phragmipedium schlimii* forma *albiflorum* (Linden ex André) Groß**

*Die Orchidee* 47(1): 13-24 [22] (1996)

Synonyms

*Cypripedium schlimii* var. *albiflorum* Linden ex André

*L'illustration horticole*, 21: 138, t. 183 (1874)

*Phragmipedium schlimii* var. *albiflorum* (Linden ex André) Braem

*Orchids (USA)*, 1[65](2): 126-131 [128] (1996)

The variety *albiflorum*, according to André (1874), was introduced about the year 1873 and was discovered on the Western Cordillera of Colombia. The plant was described as being somewhat more vigorous in growth than the nominal form, and as having narrow leaves. The flowers are white except at the base of the petals, where there is a pale rose-pink stain, and the infolded lobes of the lip, which are rose-pink (Fig. 12). The staminode is bright yellow as in the typical form. This variety, therefore, does not represent the albino of the species, which to our knowledge has not been found.

In his first volume of the *Xenia Orchidacea*, Reichenbach (1858) illustrated a section about *Phragmipedium schlimii* with the drawing shown on Fig. 13.

Reichenbach wrote that he coloured the flower according to a colour sketch sent by the collector Wagener. In the copy of the *Xenia* at the Missouri Botanical Garden Library the same plate shows another flower colouration (Fig. 14), which, in our opinion, must have been added at a later date.



**Fig. 11: *Phragmipedium schlimii* fma. *albiflorum*  
(Linden ex André) Gruß  
from André (1874)**





**Fig. 12: *Phragmipedium schlimii* fma. *albiflorum*  
(Linden ex André) Gruß**

Photograph courtesy of Sebastian Grajales-Hahn



**Fig. 13: *Phragmipedium schlimii*  
from Reichenbach (1858)**



**Fig. 14: anther colour form of *Phragmipedium schlimii***  
from a different copy of Reichenbach (1858)

***Phragmipedium fischeri* Braem & Mohr**

*Leaflets of the Schlechter Institute*, No. 3: 28-31 (1996)

Synonym

*Phragmipedium schlimii* var. *fischeri* (Braem & Mohr) Gruß

*Japan Orchid Society Bulletin*, 43: 34 (2000)

Type: Ecuador: Maldonado, 1,400 meters (ca. 4600 ft.), April 1996 (SCHLE !)

Etymology: Named *fischeri* for Mr. Jerry Lee Fischer of Orchids Limited, Plymouth, Minnesota, USA.

Discussion: Braem & Mohr described *Phragmipedium fischeri* on the basis of materials collected, as *P. schlimii*, by Gilberto Merino, collecting for Ecuagénera in Ecuador about three hours' walk from the town of Chical, along the river that marks the border with Colombia. The plants were growing on the cliffs overhanging the river. Plants were taken by Pepe Portilla to an orchid show where two plants were purchased by Jerry Fischer of Orchids Ltd. because the leaves were wider than those of the *P. schlimii* plants he had seen. Upon flowering, Mr. Fischer identified some differences in the flower structure and sent a plant for further identification and description to the Schlechter Institute. Since the description in 1996, numerous plants answering to the concept of *P. fischeri* have been examined, and we are convinced of its autonomous status at the species level, notwithstanding the fact that this decision is still questioned by some.

*Phragmipedium fischeri* differs from *P. schlimii* in a number of important characteristics:

- 1- In contrast to *Phragmipedium schlimii*, *P. fischeri* has no fenestrations.
- 2- *P. fischeri* is always self-pollinating.
- 3- *P. fischeri* has a quasi-spherical pouch.
- 4- The staminodal structure of *P. fischeri* is stable and strongly polygonal, whereas the staminodal structure of *P. schlimii* is variable and more triangular. In addition to this important difference, the staminode of *Phragmipedium schlimii* on the whole is curved like a hand with bent fingers whereas the entire staminode in *P. fischeri* is much more straight and of a more complex structure. Furthermore, the surface of the staminodal shield in *P. fischeri* shows a raised ridge, not present in *P. schlimii*.
- 5- In respect to differences in the vegetative organs, it should be noted that the leaves of *P. fischeri* are much shorter and of greater consistency than those of *P. schlimii*.

Since Garay's revision of the genus (Garay, 1979), the morphology of the staminodal shield has often been used as a major taxonomic differentiation characteristic in slipper orchids. However, staminodal morphology is often variable at the species level as stated as early as 1873 (Reichenbach, 1873). Therefore the use of staminodal morphology as a marker at that level may well require further study and reconsideration. In some species the staminodal shield is variable (cf. *P. schlimii*), in others it is not (cf. *P. fischeri*). Thus the characteristic "staminode morphology" should never be used by itself, but always in connection with other features for the differentiation of species.

The additional lobe between pouch and synsepal described from the type specimen of *Phragmipedium fischeri* appears to have been inconsistent in most other populations, and is, therefore, not suited as a taxonomic marker for the differentiation of the species.

Flower colour is also variable and may change according to climatic conditions.

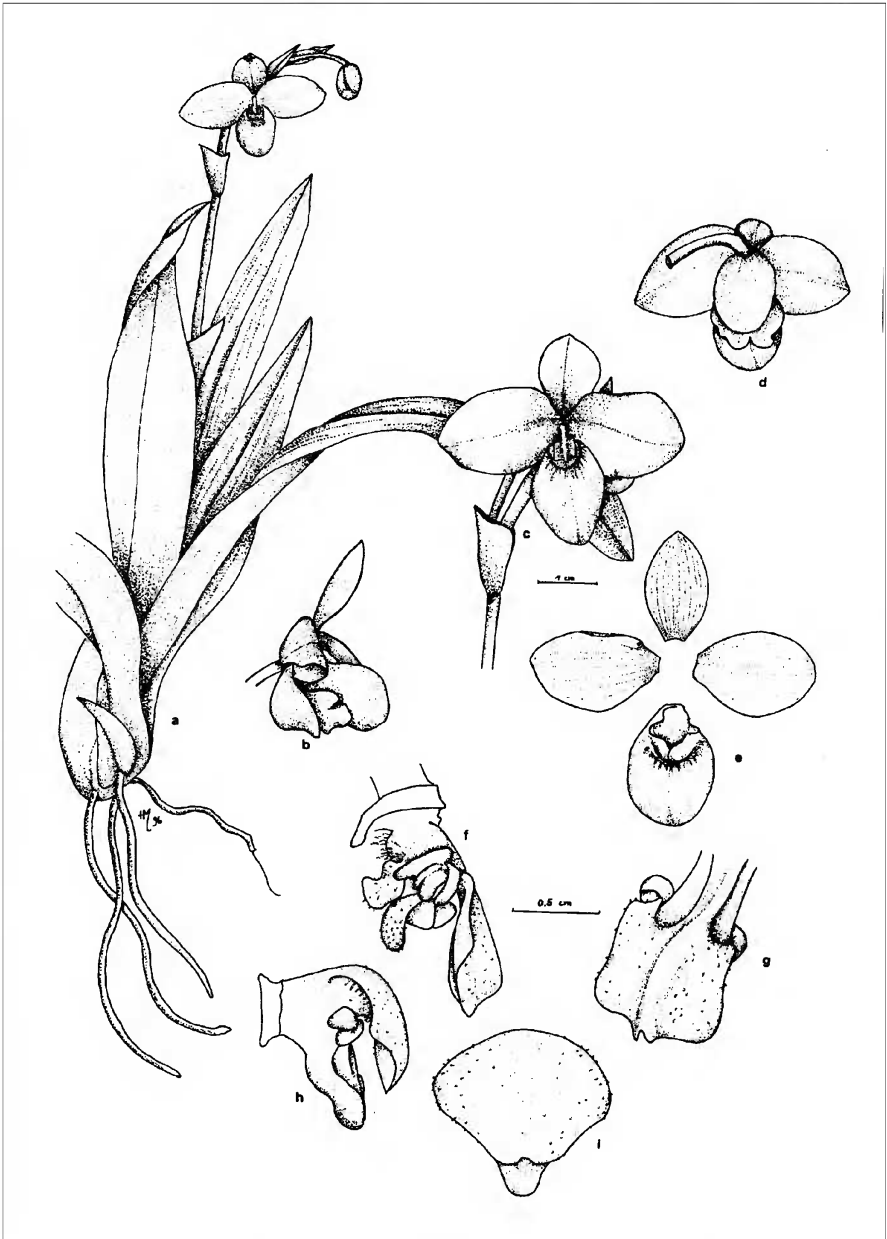
Christenson (1997) speculates that one of the plants collected by Hopp and mentioned by Rudolf Schlechter in 1924 could well have been a *P. fischeri*, as the flower colour of that specimen was said to have been "rose-red". Since the herbarium specimens in question were destroyed by act of war during WW II, such speculation is not very helpful and cannot be verified.

Description: *Phragmipedium fischeri* is an herbaceous humus epiphyte. The leaves are up to 20 cm long by more or less 3.2 cm wide. The inflorescence is 25 cm high and generates two or more flowers which open successively; the flowers are about 5 cm in natural spread. The dorsal sepal is about 2 cm long by up to 1.1 cm wide. The synsepal is about 1 cm wide and distinctly shorter than the pouch. The petals are 2.2 to 2.5 cm long by 1.5 to 1.7 cm wide. The labellum is 1.8-2 cm long by about 1.2 cm wide with the main lobe formed into a rounded pouch. Between the synsepal and the pouch there sometimes is an additional lobe of extraneous tissue broader than the synsepal but shorter than the labellum. The margins of this extra lobe are undulated. The staminode is unusually complex. The staminodal shield is more or less quadratic with a raised ridge down the middle. The overall flower colour is deep pink, distinctly darker than the colour encountered in *Phragmipedium schlimii*. The staminode is of a whitish-cream colour, the raised ridge is yellow with a purple spot at the lower end. The additional lobe and the synsepal are of a lighter pink than the rest of the flower. *Phragmipedium fischeri* has a chromosome count of  $2n = 30$  (Jerry Lee Fischer [Orchids Limited], personal communication). Fig. 15 & 16.



**Fig. 15: *Phragmipedium fischeri* Braem & Mohr**

Photograph by Eliseo Tesón



**Fig. 16: *Phragmipedium fischeri* Braem & Mohr**

A- Plant Habit. B- Flower, side view. C- Flower, front view, D- Flower, rear view, E – Flower, dissected, F- Column, lateral view, G-H-I. Staminode. Scale Bar = 5mm. Drawn by H. Mohr.

Natural Habitat and Distribution: *Phragmipedium fischeri* is hitherto known from Ecuador and Colombia. The known habitats are situated at about 1,400 meters (ca. 4,600 ft.) above sea-level, along rivers in fully shaded spots that are exposed to a constant breeze. The relative humidity is high. Just like the plants of *P. schlimii*, *P. fischeri* grows in the cracks and crevices on near-vertical cliffs with a constant water runoff.

Flowering

*Phragmipedium fischeri* generally flowers between March and May.

***Phragmipedium andreettae* Cribb & Populín**

*Lankesteriana*, 6(1): 1-4 (2006)

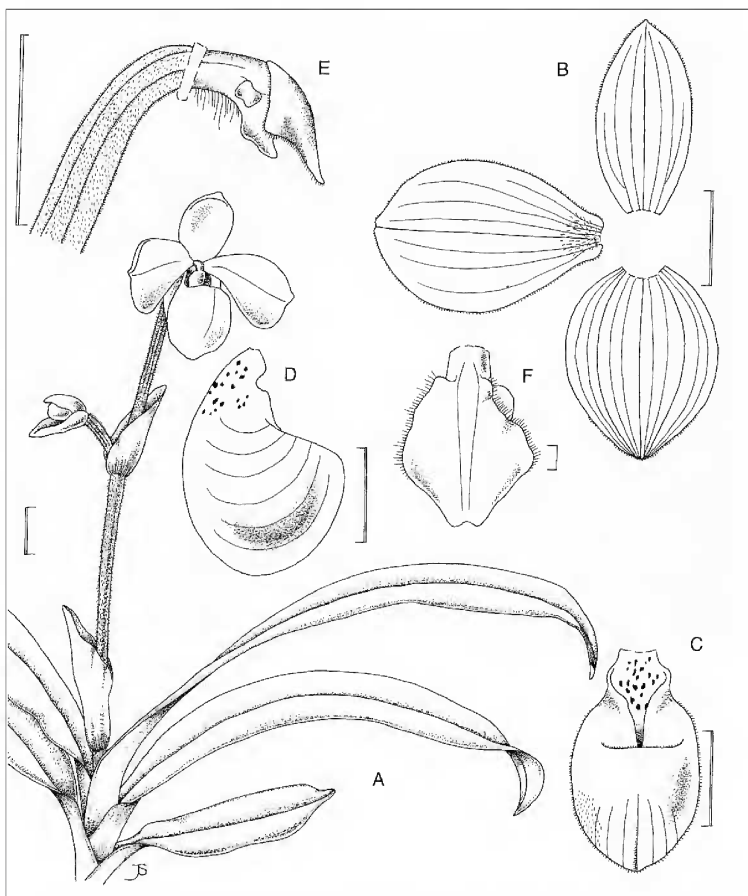
Type: Northwestern Ecuador, ex hort. Ecuagénera, November 2005, Portilla s.n. (holotype QCA).

Etymology: Named *andreettae* for Padre Angel Andreetta (1920 [Zoppola, Italy] – 2011 [Yumancay Paute, Ecuador]), a Salesian priest who had a life-long interest in orchids.



**Fig. 17: *Phragmipedium andreettae* Cribb & Populín *in situ***

Photograph by François Perrenoud



**Fig. 18: *Phragmipedium andreetae* Cribb & Populín**

A- Plant Habit. B- Petal & Sepals. C- Labellum. D- Labellum, lateral view. F- Column and staminode frontal view. Scale bars: single bar = 1mm, double bar = 1 cm from Cribb & Populín (2006)

Discussion: Ten years after the description of *Phragmipedium fischeri*, *P. andreetae* was described as a new species. This plant was collected in northwest Ecuador, about a two hour walk from the site where *P. fischeri* was discovered. Habit and habitat of the two species are similar. *P. andreetae* differs from *P. fischeri* by narrower leaves, the pale rose to whitish flowers, the elliptic to obovate petals with their reflexed margins, a narrower, rose-pink lip, and a staminode that is longer than broad and bifid. As compared to *P. schlimii*, and *P. fischeri*, the readily observable

differences are the more elongate and pointed pouch, the difference in staminodal form and the reflexed petals. The flowers vary somewhat in size, colour, and the degree at which the margins of the petals are reflexed. Furthermore, the texture of the *andreetae* flowers is much weaker than the texture of the *fischeri* blooms.

Description: *Phragmipedium andreetae* is an herbaceous plant generally growing in humus that collects in the cracks and crevices of near-vertical rock cliffs. The leaves are linear, acute, up to 16 cm long by 1.3 to 2 cm wide. The inflorescence is erect to arching, up to 16 cm high, generally unbranched. The flowers are produced in succession. The peduncle is purple, covered by fine white hairs. The sterile bracts are acute, 2 to 3 cm long, green. The fertile bracts are conduplicate, ovate-lanceolate, acute, up to 2.5 cm long and about 1 cm wide, green with some purple at the base. The flowers have pale pink sepals, white petals that are flushed with pale pink on the outside, and a white staminode that displays a yellow central spot. The lip is pink with purple hue, sometimes also with pink spots. Along the back wall within, there is a yellow stripe. The pedicel and ovary are about 6 cm long and 2 to 3 mm in diameter, purple, covered by thin white hairs. The dorsal sepal is elliptic, obtuse, about 2.2 cm long by about 1.3 cm wide, finely pubescent on the inside as well as on the outside. The synsepal is similar in shape, shorter than the pouch, about 2.2 cm long by 1.5 to 2 cm wide, the outside with two keels. The petals are elliptic to obovate, rounded, about 2.4 cm long by 1.6 cm wide with reflexed margins, hairy on both surfaces. The margins of the petals and sepals are rolled back to a varying extent. The labellum is deeply saccate, more elongate than and not as rounded as in *P. schlimii*, finely pubescent on the outside. Its side margins are incurved and hairy. The column is about 6 mm long. The staminode is obtrullate, 7 mm high by 6 mm wide, with a bifid tip. The small anthers are bilocular. The stigma is about 5 mm long, spatulate, hidden by the staminode. Fig. 17 & 18.

Natural Habitat and Distribution: Although *Phragmipedium andreetae* was described from northwest Ecuador, some doubt about the true origin of this species remains. We have received reports that hundreds of plants collected in the south of Colombia are sold as Ecuadorian plants. In Colombia it is present in Cauca Department and probably in Putumayo. The habitats are to be found at about 1,400 metres (ca. 4,600 f.), along small rivers in fully shaded spots that are exposed to a constant breeze.



According to David Angel Manzur, *Phragmipedium andreettae* may also be found around Buenaventura in the Colombian Department of Valle del Cauca where they grow sympatrically with *P. schlimii*.

Flowering: *Phragmipedium andreettae* flowers in cultivation in Colombia from March through July.

***Phragmipedium anguloi* Braem, Tesón & Manzur**

*Richardiana*, 14: 289-294 (2014)

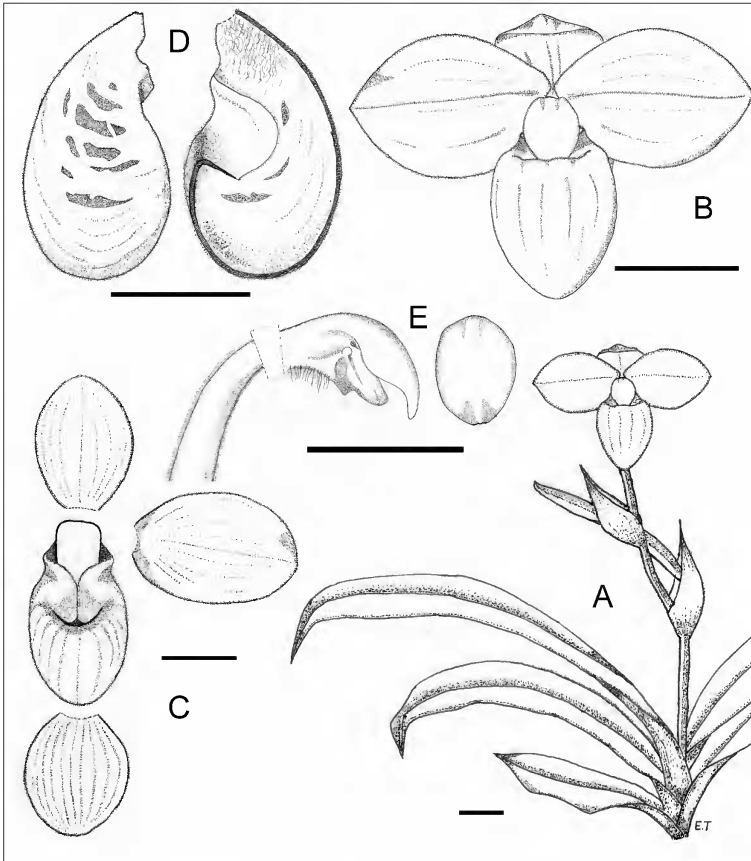
Type: Colombia, Patía-Timbío valley, 1600 m, Department of Cauca, Roberto de Angelo Blum, s.n. (Holotype: Herbarium Caldas University, Colombia).

Etymology: Named in honour of Roberto de Angulo Blum (1954- ), who discovered *P. anguloi* in 2007. Roberto de Angulo Blum is a professional architect and professor of Architecture and Natural Science at the Foundation University of Popayan, and an ardent student of orchids with a special interest in taxonomy.



**Fig. 19: *Phragmipedium anguloi* Braem, Tesón & Manzur**

Photograph by Roberto de Angulo



**Fig. 20: *Phragmipedium anguloi* Braem, Tesón & Manzur**

A- Plant Habit. B- Flower. C- Flower dissection. D- Lip, lateral and internal views. E- Column, lateral view and Staminode frontal view. Scale Bar = 10mm. Drawn by Eliseo Tesón

Discussion: *Phragmipedium anguloi* is obviously closely related to *P. andreettae*, from which it differs in three major characteristics:

- (1) The plants of *P. anguloi* are much more compact;
- (2) The staminode morphology is very different; and
- (3) The pouch morphology is different, showing very distinct and well-developed fenestrations.

From *P. schlimii* and *P. fischeri*, *P. anguloi* differs by (a) the distinct pouch morphology (elongated *versus* calceolate); and (b) the clearly unique staminodal morphology.

It has been suggested that *Phragmipedium anguloi* is a natural hybrid between *P. andreettae* and *P. schlimii* or an unnamed species more closely related to the latter species; this hypothesis, which is only based on guesswork, may be ruled out as the nearest populations of *P. schlimii* are in the Department of Valle de Cauca, more than 300 km away and the nearest populations of *P. andreettae* are in the Departments of Cauca Putumayo and Nariño, more than 150 km away. Also, *P. schlimii* var. *manzurii* may be ruled out as a putative parent of the imaginary hybrid as the nearest populations of this colour form of *P. schlimii* are to be found more than 500 km away in the Department of Santander.

Description: *Phragmipedium anguloi* is an herbaceous plant, usually growing in leafy debris and humus pockets on rocky substrate. The growths are clustered, giving the plants a compact habit. The leaves are linear, acute, 10 to 13 cm long by about 2.5 cm wide, uniformly green. The inflorescence is erect, 9 to 12 cm long, unbranched, generating several flowers in succession. The peduncle is green to brown and finely pubescent. The flower is 4.6 to 5 cm across and about 3.5 cm high. The peduncle is green to brown, finely white-pubescent. Occasionally, a sterile bract is present. It is acute, 2 to 3 cm long, and green. The fertile bracts are ovate-lanceolate, conduplicate, acute, 2 cm long by about 1 cm wide, green. The ovary is about 5.3 cm long, green to brown, finely pubescent. The dorsal sepal is about 2 cm long by 1.3 to 1.5 cm wide, very pale rose to very pale green, with more or less distinct green venation. The synsepal is about 2 cm long by 1.5 cm wide, shorter than the lip, white to rose with distinct green venation, finely pubescent. The petals are ovate, 1.9 to 2.3 cm long by 1.5 to 1.9 cm wide, white to rose, with two blurred magenta spots at the basal margin and very little magenta at the tips, finely white pubescent, the basal part on the inside villous. The labellum is deeply saccate, prolate, 1.8 to 2.0 cm long by about 1.1 cm wide, white to rose, the inside back wall with pink to magenta spots and with a yellow vertical stripe. The apical parts of the rim are dark pink to dark magenta with striations of the same colour directed toward the inside of the pouch. The outside is finely white pubescent, the inside basal section villous, the basal half of the pouch with well-developed and distinct fenestrations. The staminode is more or less ovate to rhomboid, about 7 mm long by 5 mm wide, white with a magenta spot or two parallel magenta lines at the apex and a yellow centre. In some cases, those magenta lines continue as yellow lines toward the middle of the staminode. The column is bulky.

Natural Habitat and Distribution: Colombia. The habitat is rather dry, but the plants get plenty of humidity all day from the prevailing hot but humid winds, and running water is only about 10 to 20 metres away. The plants grow in moss on a substrate of decomposed volcanic rock on steep eastern as well as western slopes, and get sun in the morning and in the afternoon.

Flowering: In its natural habitat, the peak flowering season of *Phragmipedium anguloi* is from November through February, but plants also flower at other times of the year. Plants are easy to cultivate and tolerate a wide range of temperatures.

## References

- André, E., 1874. *Cypripedium schlimii*, var. *albiflorum* Linden. *L'Illustration Horticole* 21: 138, t. 183.
- Atwood, J., 1984. The Relationships of the Slipper Orchids (subfamily Cypripedioideae). *Selbyana* 7: 129-247.
- Bateman, J., 1866. *Cypripedium Schlimii*. *Curtis's Botanical Magazine* 92, t.5614.
- Braem, G.J., 1996. *Phragmipedium schlimii* and Some of Its Hybrids. *Orchids* 1[65](2): 126-131.
- Braem, G.J. & H.Mohr, 1996. *Phragmipedium fischeri*, a New Slipper Orchid from Ecuador. *Leaflets of the Schlechter Institute* 3: 28-30.
- Braem, G.J., E.Tesón & D.Manzur Macías, 2014. *Phragmipedium anguloi*, a New Species from Colombia Belonging to *Phragmipedium* Subgenus *Micropetalum* (Orchidaceae). *Richardiana* 14: 289-294.
- Christenson, E., 1997. Split Slippers : Botany. *American Orchid Society Bulletin* 66(12); 1278-1281.
- Cribb, P. & F.Pupulin, 2006. A new *Phragmipedium* (Orchidaceae: Cypripedioideae) from Ecuador. *Lankesteriana* 6(1): 14.
- Fowlie, J.A., 1970. Orchid Collecting in the Colombian Andes: Some Lessons Learned in the Dry Barrancas of Ocaña. *The Orchid Digest* 34(1): 69.
- Garay, L.A., 1979. The Genus *Phragmipedium*. *Orchid Digest* 43(4): 133-148.
- Higgins, W.E. & P.Viveros, 2008. A new *Phragmipedium* (Orchidaceae) from Colombia. *Lankesteriana* 8(3): 8992.

- Karasawa, K., 1980. Karyomorphological Studies in *Phragmipedium*, Orchidaceae. *Bulletin of the Hiroshima Botanical Garden* 3: 149.
- Lager, J. E., 1932. Reminiscences of an Orchid Collector. *American Orchid Society Bulletin*: 1: 40-48.
- Lager, J. E., 1978. Reminiscences of an Orchid Collector. *Orchid Digest* 42: 231-239.
- Linden, J.J., J.-E. Planchon, H.G. Reichenbach & G. Lueddeman, 1855. *Selenipedium schlimii* Linden & Reichenbach fil., in *Pescatorea*: t. 34. Brussels (Belgium).
- Reichenbach, H.G., 1854. *Orchideae Schlimianae*. *Bonplandia* 2(23): 277-284.
- Reichenbach, H.G., 1858. *Selenipedium schlimii* Lind. Rchb. fil. *Xenia Orchidacea* 1:125, t. 44.
- Reichenbach, H.G., 1873. *Selenipedium Wallisii* Rchb. fil. *Xenia Orchidacea* 2(8): 189-190, 2(9): t.181.
- Rolfe, R.A., 1896. The *Cypripedium* Group. (Part 1). *The Orchid Review* 4(47): 327-334.
- Schlechter, F.R., 1924. Beiträge zur Orchideenkunde von Columbia. I. Orchidaceae Hoppianae. In Fedde, *Repertorium. Beihefte* Band 27.
- Van Houtte, L., 1870. *Selenipedium schlimii* Rchb. fil. *Flore des Serres* 18: 153, t. 1917.
- Wimber, D., 1983. *Phragmipedium* Cytology – 1 – Diploidy and Polyploidy in the Hybrids. *American Orchid Society Bulletin* 52(9): 933-939.

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